

(19)



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(11) Publication number:

**0 659 866 A3**

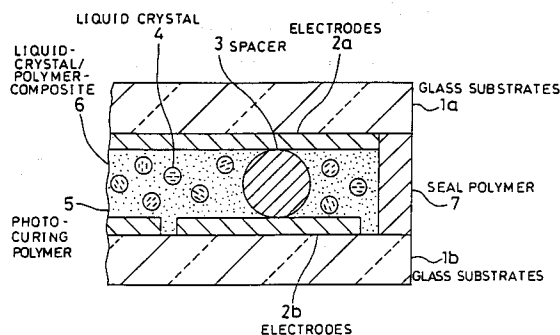
(12)

**EUROPEAN PATENT APPLICATION**(21) Application number: **94120527.0**(51) Int. Cl.<sup>6</sup>: **C09K 19/54, G02F 1/1333**(22) Date of filing: **23.12.94**(30) Priority: **27.12.93 JP 330896/93**  
**26.04.94 JP 88191/94**(43) Date of publication of application:  
**28.06.95 Bulletin 95/26**(84) Designated Contracting States:  
**DE FR NL**(88) Date of deferred publication of the search report:  
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**D-80538 München (DE)**(54) **Liquid-crystal panel, method of manufacturing the same, and liquid-crystal display apparatus.**

(57) A liquid-crystal panel comprises a pair of transparent glass substrates each being provided with an electrode. Between the glass substrates are disposed spacers for defining a space and a mixture of droplets of a liquid crystal having a mean diameter of 3.0  $\mu\text{m}$  or less and of a photo-curing polymer. The edge portions of the glass substrates are sealed with a seal polymer. In curing the photo-curing polymer during the process of manufacturing the liquid-crystal panel, the dose of an ultraviolet ray is set to 500  $\text{mJ}/\text{cm}^2$  or more so as to reduce the diameters of the droplets of the liquid crystal, thereby preventing light leakage in the state without a voltage applied and improving the contrast. If the spacers are colored, the effect of preventing light leakage is increased. If the spacers are subjected to a surface treatment for rejecting the liquid crystal or composed of a polymer material of the same type as that of the photo-curing polymer, variations in diameter of the droplets of the liquid crystal can be prevented. With

the structure, it becomes possible to provide a liquid-crystal panel in which light leakage in the black mode is reduced and which presents uniform and high-contrast display of images.

Fig.1





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## EUROPEAN SEARCH REPORT

Application Number  
EP 94 12 0527

| DOCUMENTS CONSIDERED TO BE RELEVANT                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |                                                                                                                                                                                             |                                                  |                                                 |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------|-------------------------------------------------|
| Category                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | Citation of document with indication, where appropriate, of relevant passages                                                                                                               | Relevant to claim                                | CLASSIFICATION OF THE APPLICATION (Int.Cl.6)    |
| X                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | EP-A-0 529 672 (AG TECHNOLOGY)<br>* page 7, line 23 - line 26; example 1 *<br>---                                                                                                           | 1, 11, 12, 18                                    | C09K19/54<br>G02F1/1333                         |
| X                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | EP-A-0 540 806 (TEIJIN LIMITED)<br>* page 2, line 43 - line 51 *<br>* page 8, line 51 - page 9, line 5 *<br>---                                                                             | 1, 11                                            |                                                 |
| D, A                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | PATENT ABSTRACTS OF JAPAN<br>vol. 13 no. 397 (P-928) ,5 September 1989<br>& JP-A-01 144021 (SEKISUI FINE CHEM) 6 June 1989,<br>* abstract *<br>---                                          | 1-3                                              |                                                 |
| A, P                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | EP-A-0 590 984 (SHARP KABUSHIKI KAISHA)<br>* example 18 *<br>---                                                                                                                            | 1, 11, 12                                        |                                                 |
| A                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | LIQUID CRYSTALS,<br>vol. 146, 1987<br>pages 1-15,<br>N.A.VAZ ET AL. 'a light control film<br>composed of liquid crystal droplets<br>dispersed in uv-curable polymer'<br>* page 14 *<br>---  | 1                                                | TECHNICAL FIELDS<br>SEARCHED (Int.Cl.6)<br>C09K |
| A                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | PROCEEDINGS OF THE SID ,<br>vol. 32, no. 3, 1991 US,<br>pages 173-176,<br>A.M.LACKNER ET AL. 'methods to obtain<br>lower-voltage-activated polymer-dispersed<br>lcDs'<br>* table 1 *<br>--- | 1                                                |                                                 |
| A                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | EP-A-0 409 442 (TALIQ CORPORATION)<br>* page 4, line 55 - page 5, line 2 *<br>* claims 1,6,10,11 *<br>-----                                                                                 | 1                                                |                                                 |
| The present search report has been drawn up for all claims                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |                                                                                                                                                                                             |                                                  |                                                 |
| Place of search<br>THE HAGUE                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |                                                                                                                                                                                             | Date of completion of the search<br>26 July 1995 | Examiner<br>Puetz, C                            |
| <b>CATEGORY OF CITED DOCUMENTS</b><br>X : particularly relevant if taken alone<br>Y : particularly relevant if combined with another document of the same category<br>A : technological background<br>O : non-written disclosure<br>P : intermediate document<br>T : theory or principle underlying the invention<br>E : earlier patent document, but published on, or after the filing date<br>D : document cited in the application<br>I : document cited for other reasons<br>-----<br>& : member of the same patent family, corresponding document |                                                                                                                                                                                             |                                                  |                                                 |